Math 172 3.23 Thing

Name: ____________________

23 Mar 2017 No work expected. Point Values in [boxes].

1. Fill in the blanks.

For \( c \neq 0, \sum_{n=0}^{\infty} cr^n \) converges to \( _________ \) if \( _________ \) and diverges if \( _________ \).

2. Please indicate True or False.

(a) T / F: If \( a_n \to 0 \) as \( n \to \infty \), the series \( \sum a_n \) converges.
(b) T / F: If \( a_n \to 0 \) as \( n \to \infty \), the series \( \sum a_n \) diverges.
(c) T / F: If \( a_n \to 0 \) as \( n \to \infty \), the series \( \sum a_n \) neither converges nor diverges.
(d) T / F: If \( a_n \to 2 \) as \( n \to \infty \), the series \( \sum a_n \) diverges.
(e) T / F: The geometric series

\[
1 + \frac{5}{2} + \frac{25}{4} + \frac{125}{8} + \frac{625}{16} + \cdots
\]

converges to \( \frac{1}{1 - \frac{5}{2}} \).
(f) T / F: The geometric series

\[
1 - \frac{2}{5} + \frac{4}{25} - \frac{8}{125} + \frac{16}{625} - \cdots
\]

converges to \( \frac{1}{1 + \frac{2}{5}} \).

3. For each of the following series, determine if it is a Convergent geometric series, a Divergent geometric series, or Not a geometric series.

(a) C / D / N: \( \sum \left( \frac{3}{n} \right)^n \)
(b) C / D / N: \( \sum 4^{-n} \)
(c) C / D / N: \( \sum \frac{-7}{3^n} \)
(d) C / D / N: \( \sum \frac{3^{2n}}{(-7)^n} \)

4. We discussed the Integral Test in class on Tuesday. In order to apply that test we need a function \( f(x) \) with the following properties. (Choose all that are required. Assume each statement is true for all \( x > N \).)

(a) \( f(x) > 0 \)
(b) \( f(x) < 0 \)
(c) \( f'(x) > 0 \)
(d) \( f'(x) < 0 \)
(e) \( f(x) \) is continuous
(f) \( f(x) \) is differentiable

5. For each statement, determine if the use of the Comparison Test is Valid or Invalid.

(a) V / I: Since \( 0 < \frac{1}{n} < \frac{1}{n-1} \) and \( \sum \frac{1}{n} \) diverges, by comparison \( \sum \frac{1}{n-1} \) also diverges.
(b) V / I: Since \( 0 < \frac{1}{n+3} < \frac{1}{n} \) and \( \sum \frac{1}{n} \) diverges, by comparison \( \sum \frac{1}{n+3} \) also diverges.